8-4.6   Explain how gravitational forces are influenced by mass and distance.
  Taxonomy level: 2.7-B   Understand Conceptual Knowledge

Previous/Future knowledge: The pull of gravity and its effect on motion was introduced in 3rd grade (3-5.4). In 5th grade (5-5.1), students will identify gravity as a force that affects motion. High school Physical Science and Physics will continue the study of gravity as related to acceleration, projectile motion, and gravitational potential energy.

It is essential for students to know that the force of *gravity* is a pull between all objects in the universe. This force is influenced by the mass of the objects and the distance between them.
- A more massive object has the greater pull on the less massive objects; the Sun being most massive object in the solar system has the greatest pull on objects, like planets, in the solar system.
- The closer the distance between objects the greater the pull; the Moon has a greater effect on Earth's tides than the Sun because it is closer to Earth.
- These two factors of gravitational force have numerous applications on motions of celestial bodies, for example the gravitational pull between the Sun and the planets and between Earth and its Moon cause distinct motions between and among these bodies (8-4.7).

It is not essential for students to know the inverse square law relationship of gravity to distance or mass. The concept of acceleration due to gravity is also not essential to the indicator.

Assessment Guidelines:
The objective of this indicator is to *explain* how gravitational forces are influenced by mass and distance; therefore, the primary focus of assessment should be to construct a cause-and-effect model of objects varying these factors. However, appropriate assessments should also require students to *interpret* diagrams that show varying aspects of these factors; or *infer* how a change in one factor would change the force of gravity.